

ON *FREGETTA* BONAPARTE AND ALLIED GENERA.

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(With Plates IV–IX, and two text-figures.)

IN order to name correctly the forms of *Fregetta* collected on the Tristan group, it was necessary to work up all the material available of the birds in this genus, including the species *grallaria* with which *leucogaster* has been confused.

When Bonaparte introduced his genus *Fregetta* in *Comptes Rendus Acad. Sci. Paris*, vol. xli, p. 1113, December 31st, 1855, he started off: "20 *Fregetta tropica* Bp. ex Gould," on the bottom of p. 1112, and on the next page says: "Parmi les genres et sous-genres que comprend ce groupe (*Procellariés*, généralement connus sous le nom de *Thalassidromes*), il en est un que j'ai nommé *Fregetta* dans la partie de mon *Conspectus* non encore publié. . . ." As a matter of fact, this part of his *Conspectus Generum Avium*, containing p. 198, did not appear till October 1st, 1857, with his name spelt *laurencii* given to a bird collected in Florida and called *Thalassidroma fregetta* Lawrence, not Kuhl; whereas this name spelt *lawrencii* appeared in the *Comptes Rendus*, vol. xlii, p. 769, on April 28th, 1856. He then gives his diagnosis and continues, "ce genre comprend la *leucogastra*, Gould, qui en est le type, et ma *Fr. laurencii* prise pour elle en Amerique."

The genus *Fregetta* Bp. is diagnosed thus:


"Ce genre est bien caractérisé; son bec est petit, à tube nasal retroussé; ses ailes s'étendent bien au delà de la queue, que les pieds ne peuvent outre passer malgré leurs longs tarsi, parce que le *podium* en est extrêmement court; les doigts sont gros et palmés jusqu'aux bords; les ongles petits, mais fortement déprimés. . . ."

He goes on to say, "la *melanogastra* Gould, bien distincte de ma *Thalassidroma oceanica* aux larges ongles de Grèbes presque humains, diffère à peine de la *leucogastra*."

This last sentence shows that Bonaparte was using Gould's *leucogaster*.

When Ridgway introduced his genus *Cymodroma* in *Mem. Comp. Mus. Zool. Harvard (Water Birds, North America, vol. ii)*, vol. xiii, pp. 363 and 418, 1884 (introd. March 31st), he says: "So far as we are aware, the black-and-white Stormy Petrel is only known to have been taken in a single instance within our waters . . . on the Gulf Coast of Florida."

He said that the tail was even, the feathers exceedingly broad, with truncated tips; tarsus about twice as long as the middle toe without the claw (more than two and a half times as long as the culmen).

On p. 418 he uses this name *Cymodroma* to replace *Fregetta* Bp., the type of which he gives as *Procellaria tropica* Gould, not *Fregata* Briss. 1760. He then gives his generic characters as: small size; inner toe about equal to or slightly longer than the middle, which is decidedly shorter than the outer; claws very broad and flat, somewhat  shaped; tarsus as given above; tail more than half as long as the wing, and even, the feathers extremely broad,

and truncated at the tip; plumage partly coloured. Only one species of this very peculiar genus belongs to the North American fauna, and this on account of its accidental occurrence on the coast of Florida. He then uses the name *Cymodroma grallaria*, of which he makes Gould's *leucogaster* a synonym.

The Storm Petrel which occurs in America is the one Lawrence mentions, who says that one of these birds was secured by Mr. John Hooper, of Brooklyn, N.Y., and which I believe to be *grallaria*.

Now, so far as I know, no one has written on these specimens since, and the type of *lawrencii* is presumed to be lost. Dr. Frank Chapman writes me that he has tried unsuccessfully to locate the type.

The description of *Thalassidroma fregetta* as given by George N. Lawrence on p. 117 of the *Annals of the Lyceum of Natural History of New York*, vol. v, pt. 2, for May 1851 is of specimens taken in the harbour of St. Marks, Florida, in the South of the United States of North America.

"Length about eight inches (= 203 mm.); wing from flexure six inches (= 152 mm.); tail three inches (= 76 mm.); tarsus $1\frac{3}{8}$ inches (= 34 mm.).

"Head and wings black; neck, breast and back dusky bluish ash or dark plumbeous; wing coverts brown; tail perfectly even, with the two central feathers black, the others white at the base for half their length, terminating with black; abdomen, inside covering of wings and rump white; bills and legs black.

"The claws are peculiarly shaped, being depressed, ovate and as broad as they are long.

"They were observed about the vessel during two days, after which none were met with."

This agrees very well with a winter-worn specimen of *grallaria*, except that no mention is made of the white edges to the feathers of the back, which may have been worn off. However, the measurements are about the same as those of the typical *grallaria*. Can we therefore with justice place *lawrencii* of Bonaparte as a synonym of *grallaria*?

Both Bonaparte and Ridgway record a Storm Petrel from America, but neither of these authors examined the skin as far as I can ascertain at present. There can be no doubt that about this time *grallaria* was mistaken for *leucogaster*, as proved by the works of these two authors. In his original description Gould does not mention the short toes, but he does in his folio work.

When Ridgway introduced *Cymodroma* he diagnosed the foot as having the inner and middle toe of about equal length and decidedly shorter than the outer. If we read inner for outer and outer for inner we get a perfect diagnosis of the foot of *leucogaster*, i.e. the outer and middle toe and claw of about equal length and the inner toe and claw shorter by 2 or 3 mm.

It seems at present that the Storm Petrel which was collected in Florida is *grallaria*, but that neither *Fregetta* or *Cymodroma* was founded on it. *Fregetta* Bp. type *leucogaster* by original designation. *Cymodroma* Ridgway, from his diagnosis, type *leucogaster* by present designation.

This author says that seven examples were "said to have been captured," so apparently were not included in the material he used. His measurements read: wing 6 to 6.5 inches (= 152-164), tail 3 to 3.3 (= 75-83), culmen .50 (= 13), middle toe without claw .80 (= 20 mm.).

Ridgway considered his genus to be equal to *Fregetta* of Bonaparte, which

he also considered preoccupied by *Fregata* Brisson 1760. Although he used *Cymodroma gallaria*, he put Gould's *leucogaster* as a synonym, showing that he mixed these two species. As shown above, his diagnosis fits the foot of Gould's bird and not *gallaria*.

KEY TO THE GENERA.

A. Toes wide and flat, claws not pointed.

a. Measurement from outside of inner claw to outside of outer claw, in life about equal in length to the middle toe and claw; that is roughly equilateral, as in *gallaria*. Basal joint of middle toe scaled. Outer toe and claw a little longer than the middle toe and claw, which is a trifle longer than the inner toe and claw (Pl. IX, figs. 3, 4, 5, 7)

Fregattornis.

b. Measurement from outside of inner claw to outside of outer claw much less than the length of the middle toe and claw; that is roughly isosceles triangular, as in *tropica*, *leucogaster* and *lineata*. Basal joint of middle toe not scaled.

a. Outer toe and claw equal in length to the middle toe and claw; inner toe and claw shorter by a few millimetres (Pl. IX, figs. 1, 2, 6) *Fregatta.*

b. Inner toe and claw shorter by four or five millimetres (Pl. IX, fig. 8) *Pealea.*

B. Toes thin and claws pointed.

Foot isosceles triangular. Middle toe and claw longest; inner toe and claw shortest. Tail feathers narrow. Basal joint of middle toe scaled (Pl. IX, fig. 10) *Pealeornis.*

Another way to distinguish the genera is:

A. First primary about as long as the third *Pealea.*

B. First primary shorter than the third.

a. Toes thin and claws pointed *Pealeornis.*

b. Toes wide and flat, claws not pointed.

a. Foot equilaterally triangular *Fregattornis.*

b. Foot isosceles triangular *Fregatta.*

In the 10th edition of Carl von Linné's work, p. 131, January 1st, 1758, is described the first Storm Petrel as *Procellaria pelagica* "in (albo =) alto oceano"; the type locality is restricted to Sweden. For this form three genera were proposed, viz. *Hydrobates* Boie 1822; *Thalassidroma* Vigors 1825; and *Zalochelidon* Billberg 1828. This bird has never caused any trouble; it is figured in Dresser's *Birds of Europe*, vol. viii, pl. 613, and Hartert, in *Die Vögel der Pal. Fauna*, vol. ii, p. 1410, 1920, has worked it up to date.

GENUS *FREGETTA* BONAPARTE.

Fregatta Bonaparte, *Compt. Rend. Ac. Sci. Paris*, vol. xli, p. 1113 (1855), type "*leucogastra* Gould."

KEY TO SPECIES.

(A. Not determinable *F. fregata.*)

B. Upper surface with narrow white edges to the feathers *F. tropica.*

C. Upper surface with wide white edges to the feathers *F. leucogaster.*

In the 12th edition, p. 212, 1766 (pref. May 24th), Linné added another Storm Petrel as *fregata*, from "in oceano."

Latham, in *General Synopsis, Birds*, vol. iii, pt. 2, p. 410, No. 17, 1785, from an examination of a drawing in Sir Joseph Banks's collection, says that it is found in latitude 37° South. This is copied by Gmelin, 1789, p. 561. This bird has been a stumbling-block ever since.

When I published the second volume of my *Birds of Australia*, pt. 1, May 30th, 1912, on p. 38 I printed Solander's beautiful description of *fregata*, which is not the basis of Linné's name, and the type locality was fixed as the mouth of the Rio de la Plata on the east coast of South America. This bird was collected on December 22nd, 1768, and not brought to this country till 1771, but believed by Solander to be identical with Linné's bird.

FREGETTA FREGATA (L.). The Elusive Storm Petrel.

? *Procellaria fregata* Linné, *Syst. Nat.*, ed. xii, vol. i, p. 212, 1766 (pref. May 24th). Habitat in Oceano.

"*Frigate Petrel*" Latham, *Gen. Syn. Birds*, vol. iii, pt. 2, p. 410, 1785, Latitude 37° South.

Procellaria fregata Gmelin, *Syst. Nat.*, vol. i, pt. 2, p. 561, April 20th, 1789, Latitude 37° = mouth of the Rio de la Plata; Mathews, *Birds Austral.*, vol. ii, pt. 1, p. 38, May 30th, 1912 (ex Solander MS.), mouth of the Rio de la Plata.

The following is a description of Gmelin's bird :

Procellaria fregata, black, with the abdomen and rump white, the feet wholly black. *Linn. Syst.*, 212.2.

Figured.

Habitat in South American Ocean, S. Lat. 37° (December 22nd, 1768).

Variety ; with black stripe on abdomen ; in the Antarctic Ocean at South Terra del Fuego, S. Lat. 58° (February 2nd, 1769).

(a) Head, neck, breast, back, wings and tail black.

Throat ashy-white.

Abdomen, vent and rump white.

Feathers of crissum white at base, blackish at tip.

Under wing coverts, whitish.

Eyes black.

Bill shiny black.

Upper mandible with compressed awl-shaped hook, in front of the nasal tubes a deep short channelled groove running forward.

Nasal tube not attaining the middle of the bill, subcylindrical, with the end raised above the bill, and here entire, with the opening circular.

Lower mandible shorter, a little bent down at the apex.

Wings long and lanceolate.

Feet entirely deep black.

Nails very short, broad, oval, sharp.

Hind-toe small, sessile.

Tail short, even.

Rectrices 12, all black.

Length from tip of bill to end of tail, 7½ inches (190 mm.).

Width between tips of wings, 16½ inches.

Weight, 1½ ounces.

(b) Variety from the ocean at South Terra del Fuego, with a stripe from the breast along the middle of the abdomen to the crissum black; otherwise very similar and also the same in size.

Now the point arises, is Linné's bird the same species as the one described by Latham in 1785? If not, it is indeterminable. Latham's and Gmelin's bird is of course the same as Solander's.

FREGETTA TROPICA (Gould).

Three subspecies:

FREGETTA TROPICA TROPICA (Gould). The Tropic Storm Petrel.

(Pl. VIII; Pl. IX, figs. 1, 1a.)

In the *Catalogue of Birds*, vol. xxv, p. 365, 1896, this form was considered identical with *melanogaster*.

The following is a description of the type:

General colour of the upper surface blackish brown; the head and back darkest and divided by the lighter feathers on the nape; some of the feathers of the back have very narrow white edges; upper tail coverts white, some of the feathers of the back, immediately above this white band, have large white bases and a wide subterminal black band and fringed with a narrow white end; tail black, all but the central pair with white bases; the central pair of tail feathers is the shortest, the next pair a little longer and so on till the outer pair, which is the longest; shortest (central) pair measure 70 mm.; the outermost 79 mm.; primaries and secondaries black, the inner web lighter towards the inner edge; the bases of the inner web fringed with white; primary wing coverts black, remaining wing coverts brownish black like the nape of the neck; throat whitish; lores, sides of face, breast and chest dark brownish black, like the nape; sides of the body, axillaries and most of the belly white; the feathers of the abdomen have large white bases to the feathers for two-thirds of their length, the remaining third has a wide brown band, thus making a brown patch; a few such brown feathers, with large white bases, connect the abdomen with the chest, but under no condition can it be called a band; under tail coverts with extended white bases and ending with a wide brown bar, the longest under tail coverts are about half white and brown; under aspect of tail feathers brown; inner under wing lining white, surrounded by a wide band of brownish black running right round the wing; under aspect of primaries brown; under primary coverts light brown, all but the first fringed with white; before the eye some of the feathers have white bases. Eyes brown, bill, feet and legs black. Total length 220 mm.; wing 170; culmen 15; tail 79; tarsus 41; middle toe and claw 29; inner toe and claw 26. Lat. 6° 33' N., Long. 18° 6' W. The tarsus and basal joint of the middle toe is booted.

Another skin, from Lat. 0.2 S., Long. 30 W. (collected by the *Transit of Venus* Exp., Sp. b. in *Cat. Birds*; pres. by Capt. Stanley), resembles the type in general appearance, the abdomen is perhaps a little more brownish, and this colour extends farther towards the chest. Many of the feathers on the back and wing coverts have a very narrow fringe of white; it seems to be a younger bird. Wing 173 mm.; culmen 16; tail 80; tarsus 40; middle toe and claw 29, inner toe and claw 26. Two specimens examined.

Distr.—This form does not appear to wander far from the type locality; this is on the equator, a little north, viz. 6° 33' North Lat. and 18° 6' West Long., off Sierra Leone. In the Atlantic Ocean. Perhaps breeding south of the line on Ascension Island, but this is not proven. Has occurred as far north as the Canaries. It appears never to have the decided black band running from the vent to the chest.

In the *Journal für Ornithologie* for 1905 Vanhöffen had a paper (pp. 500–515) on the German South Polar Expedition and a most useful map. In this he considers the northern distribution of the birds of the Tropics to be about 33° above the line in the Atlantic Ocean; and the Southern boundary a line from about 25° South, from South America, curving a few degrees farther south and then curving up to South Africa about 15° South. This, then, should be the distribution of *tropica*, as so far it has only been collected in this area. Vanhöffen's line is continued from the east of South Africa from about 27° S. curving a few degrees north to cut off the south of Madagascar, then curving south to the 30°, and running up to the North-West Cape in Western Australia to about 27° South. His other division is roughly about 65° South.

FREGETTA TROPICA MELANOGASTER (Gould). **Black-bellied Storm Petrel.**

(Pl. IX, figs. 2, 2a.)

Syn.: *Fregatta tubulata* Mathews, *Birds Austral.*, vol. ii, p. 42, May 30th, 1912. Near the coasts of (West) Australia.

In the *Catalogue of Birds*, vol. xxv, p. 364, 1896, this bird is put in the genus *Cymodroma*. The type locality is off St. Paul and Amsterdam Islands, breeding on Kerguelen Island. It is figured as *Thalassidroma melanogaster* by Gould in his *Birds of Australia*, vol. vii, pl. 62 (pt. xxvi), March 1st, 1847.

Adult, Male.—General colour above sooty black, darkest on the head; upper tail coverts white, some of the feathers of the back, immediately above the white feathers, have white bases; tail black, all but the central pair with white bases; the central pair of tail feathers is the shortest (70 mm.) and the outer pair the longest (80 mm.); primaries and secondaries black, the inner web lighter; primary wing coverts black, remainder of the wing coverts brownish; the under surface, including the throat, chest and a broad band running right to the vent, blackish brown; the feathers of the throat with white bases, which in the make-up of some skins gives a mottled appearance; some, but not all, the feathers of the brown band on the belly have white bases; others being uniform brown, lighter coloured at the base; the under tail coverts with large white bases, with the terminal third brownish; in some more brownish on the inner web only, and some with white fringes; sides of the body and axillaries white; under aspect of the tail feathers brownish black; inner underwing lining white, surrounded by a widish band of blackish brown running round the wing; under aspect of the primaries brown; under primary coverts light brown, all but the first fringed with white. Eyes brown; bill, feet and legs black. Total length 230 mm.; wing 172; culmen 15; tail 80; tarsus 42; middle toe and claw 28. Deception Island, South Shetland, December 26th, 1923.

Adult Female, collected at the same time and place, agrees, except that the

band on the belly is not so pronounced. Total length 220 mm.; wing 167; culmen 16; tail 77; tarsus 40; middle toe and claw 27.

A pair collected in South Lat. $42^{\circ} 23'$ and East Long. $20^{\circ} 32'$ (West of Prince Edward Island) agrees, but each sex is smaller than the corresponding one from Deception Island. Male: wing 163 mm.; culmen 14; tail 79; tarsus 39; middle toe and claw 27. Female: wing 163 mm.; culmen 14; tail 76; tarsus 37; middle toe and claw 26.

This form only sometimes seems to have the white throat of *F. t. tropica*, although it is suggested by the white bases to the feathers. In some skins a very narrow line of white fringes some of the feathers of the upper surface, but this is the exception in the material in hand, 9 from Kerguelen Island and west, at sea near there, 8 from New Zealand and Australia, 7 from South Shetland Island, 7 from the New York Museum, 6 from Tring Museum, 4 others from Australia, and some odd skins, making over 45 skins examined.

Fregetta t. melanogaster differs from *F. t. tropica* in not always having the white throat and in having the abdominal band always distinctly marked, not only indicated. The distribution, as at present known of each of these two forms, is divided by a distinct species, *F. grallaria tristanensis*, the tropical Storm Petrel only having been so far discovered near the line in the Atlantic Ocean. When we get a series of birds from the breeding locality, like South Georgia, we find them to be very constant. The feathers on the back in some few cases have very narrow white fringes, but could never be mistaken for *leucogaster* or *grallaria*.

a. *Fregetta tropica melanogaster* (Gould).

Distr.—Indian Ocean, Kerguelen Island (breeding), St. Paul and Amsterdam Islands. Apparently common from the Agulhas Bank, at the extreme south of Cape Colony, eastwards to Australia. (Occurring on west Australian coast probably.) The South Atlantic Ocean, breeding on South Shetland and South Orkney Islands.

b. *F. tropica australia* Mathews.

Distr.—South Pacific Ocean. Breeding on the subantarctic islands of New Zealand. Occurring on the east coast of Australia, and east up to Peru, 20 miles west of Cañete, June 26th, 1913.

c. *F. tropica tropica* (Gould).

Distr.—Atlantic Ocean only, about the equator, wandering as far north as the Canaries and as far south as Trinidad (breeding on Ascension?).

While there are names for three subspecies of *tropica* corresponding to breeding habitats, it is very difficult to distinguish them. One typical form from the Atlantic Ocean, on the equator, which is *tropica*, and another, *melanogaster*, from the South Atlantic, Indian and South Pacific Oceans, would be a better way to treat them.

From the material sent over from the Mackay and Sydney Museums I find that *melanogaster* occurs off the eastern coast of New South Wales, and apparently is not rare.

The foot has the outer and middle toes with claw of equal length, the inner toe and claw shorter by $2\frac{1}{2}$ –3 mm.; the basal joint of all the toes is not scaled and the tarsus is booted. However, under a powerful magnifying glass, some

rudimentary scales are noticed on the inner and outer basal toe joints and near the top and bottom joints of the tarsus. In some specimens of *grallaria* the scaled tarsus is not always pronounced.

KEY TO THE SUBSPECIES.

- a*¹. Sides of body white; vent and some feathers of the lower breast with dark tips *F. t. tropica*.
*a*². Sides of body white; distinct dark band from breast to vent.
 *b*¹. Wing smaller *F. t. melanogaster*.
 *b*². Wing larger *F. t. australis*.

FREGETTA LEUCOGASTER Gould. **The White-bellied Storm Petrel.**

Two subspecies: *F. l. leucogaster* and *F. l. deceptis*.

FREGETTA LEUCOGASTER LEUCOGASTER (Gould).

Thalassidroma leucogaster Gould, *Ann. Mag. Nat. Hist.*, vol. xiii, p. 367, May 1st, 1844, 36° S. Lat., 6° 47' E. Long., collected by His Excellency Governor Grey, between Tristan da Cunha and the Cape of Good Hope. Gould, *Birds Austr.*, vol. vii, pl. 63, March 1st, 1847.

Cymodroma grallaria (not Vieillot), Godman, *Monogr. Petrels*, pt. 1, pl. 18, December 1907, and some of the letterpress.

As I pointed out in my *Birds of Australia*, vol. ii, pt. 1, pp. 35-44, 1912, *leucogaster* is not a synonym of *grallaria* Vieillot, but a different species, even a different genus; cf. also *Birds of Norfolk and Lord Howe Islands*, p. 9, October 16th, 1928.

Gould's type of *leucogaster* collected by Governor Grey is still in the Bird Room of the Natural History Museum.

The bird figured in Gould's *Birds of Australia*, pt. xxvi, 1847, as *Thalassidroma leucogaster* has the basal toe joint showing scales. The shape of the foot, however, in spite of the scaled toes (which I think were added by the artist) show it to be the form named *leucogaster*.

This form has been the stumbling-block to many.

I think that Gould had one of the birds from Tristan (*tristanensis*) in his mind when he mentioned that *leucogaster* had shorter toes than *melanogaster*, because this is so of the Tristan birds, whereas in his own drawing no such shortness is apparent. Or perhaps he had a skin of *grallaria*.

Further in support of this are the two skins which Gould collected in the South Indian Ocean and labelled *leucogaster* now in the Melbourne Museum in Victoria, and these agree absolutely with Gould's type. In the letterpress Gould says that he encountered it generally over the South Indian Ocean.

Total length 7¼ inches (= 184 mm.); bill ¾ (= 18); wing 6 (= 152); tail 3 (= 76); tarsus 1½ (= 38); middle toe and claw 1 (= 25).

FREGETTA LEUCOGASTER DECEPTIS.

(Pl. VII; Pl. IX, fig. 6.)

There is a form of Storm Petrel which resembles *leucogaster* in general appearance, and in a skin in the Tring Museum, from the H. Whiteley collection obtained off New Zealand, the under surface resembles that part of *leucogaster*; the upper surface has the wide white fringes to the feathers. That is to say, this

form differs from *melanogaster* in lacking altogether the dark band from the chest to the vent, and in having wide white fringes to the feathers of the upper surface; it differs from *leucogaster* in being larger in the wing. I have called it *Fregetta leucogaster deceptis* in the *Bull. B.O.C.* 1932, vol. lii, p. 146, June 28th. Six specimens examined.

The distribution of *Fregetta leucogaster deceptis* will then be the South Pacific Ocean, off New Zealand, type locality; and the South Indian Ocean (cf. "*Emu*, vol. xxii, 1922").

A bird collected by Macgillivray on January 7th, 1853, in South Lat. $37\frac{1}{2}^{\circ}$ and East Long. 42° , between Madagascar and Prince Edward Island, is of this form. The tail is about even, the central pair of feathers perhaps shorter than the outer; the throat feathers have a white bar, the under tail coverts similar to those of *leucogaster*; the longest under tail coverts reach to the tip of the tail feathers. Total length 210 mm.; culmen 15; wing 163; tail 73; tarsus 40; middle and outer toe and claw 26; inner toe and claw about $2\frac{1}{2}$ mm. shorter.

Adult (type of *deceptis*, Pl. VII; Pl. IX, fig. 6).—General colour of the upper surface blackish brown, including the nape, back and scapulars; the feathers of the back and scapulars with distinct white fringes; top of the head and cheeks black; upper tail coverts white, some of the feathers immediately above these white feathers have large white bases, followed by a blackish band and fringed with a less wide margin of white; tail with the central pair of feathers the shortest and the outer pair the longest; tail feathers black, all but the central pair with white bases; primaries black, lighter on the outer edge of the inner web and whitish towards the base; primary coverts blackish, secondaries and coverts lighter brownish; bastard wing black, bend of the wing blackish brown; throat feathers brownish at the base and tip, divided by a wide band of white; the feathers of the breast brownish with lighter-coloured bases; the lower breast, belly, vent and axillaries white, the feathers immediately above the white under surface have brown bases and tips divided by a large white band; thighs brownish; under tail coverts white with a broad subterminal band of brown and fringed with white; the longest under tail coverts have the brown and white equally divided; under aspect of primaries silver brown; under primary coverts brown, all but the outer one fringed with white; a band running round the outside of the underwing brownish with lighter edges to the feathers; inner underwing lining white; eyes brown; bill, legs and feet black. Total length 230 mm.; culmen 15; wing 167; tail 78 (central pair; outer pair 80); tarsus 39; middle toe and claw 26, outer 26, inner 23. Collected off New Zealand. Tarsus booted; toe joints flat, basal ones not scaled.

The sexes are alike.

Immature resembles the adults, after losing the down. *Nest and eggs* indistinguishable, no doubt, from those of *melanogaster*.

Breeding season, no doubt, the same months as *melanogaster*.

From the National Museum, Melbourne, Victoria, I have received three skins of *Fregetta tropica melanogaster*, and two of *leucogaster*, all determined by Gould, who presented the skins. These are the birds used by Messrs. Kinghorn and Cayley, *Emu*, vol. xxii, October 1922: No. 1 from South Lat. $43^{\circ} 18'$; East Long. $140^{\circ} 52'$, a male; the other two from the Atlantic Ocean, with no further data, these latter are called *tropica*, but have the dark band from the vent to the breast and are of course the subspecies *melanogaster*, if that form is admitted.

All three have the white throat, that is to say, the basal half of the throat feathers is white, the distal half brown; all have imperceptible white fringes to the feathers of the upper surface, and the foot with the basal joints of the toes not sealed, in fact they are typical *Fregatta tropica melanogaster* and need worry us no more.

The two skins, a sexed pair, from the South Indian Ocean and no other data, determined by Gould as his *leucogaster* are of the utmost importance.

The male has the wide white fringes to the feathers of the upper surface; back and scapulars dark blackish brown; head, tail and primaries black; throat feathers brown with a large white bar; upper breast brownish; from there to the vent pure white as in *grallaria*; under tail coverts with large white bases to the feathers for two-thirds of the distance, followed by a wide band of brownish black, and fringed with white. Wings worn and measure 160 mm. plus the wear; culmen 15; tail even; the middle pair a trifle shorter; tarsus 40; outer and middle toe and claw 28; inner toe and claw 25. The female is similar, but the white edges to the feathers on the upper surface not so wide. She also is a weather-worn specimen and we cannot see the shape of the tail or measure it with any certainty, nor can we be sure of the length of the wing. Wing 160 mm. plus wear; culmen 14; tail 75; tarsus 41; outer and middle toe and claw 28, inner 25. What is of interest also is that this form occurs in the South Indian Ocean.

It cannot be the winter plumage of *melanogaster*, as we do not know of any petrel which has a breeding plumage. There is no doubt about its close relationship with *melanogaster*. The shape and formation of the foot will always separate it from *grallaria*.

F. leucogaster can always be separated from any form of *tropica* by the wide white fringes to the feathers of the upper surface. The winter specimens, instead of losing the white fringes, seem to retain them. As no form of *tropica*, even in perfect plumage, has such wide and pronounced fringes to the feathers of the upper surface, *leucogaster* can never be mistaken for it. Can it be that *leucogaster* has the white bases to the tail feathers of a different pattern from those of *melanogaster*?

During the non-breeding season *leucogaster* and *melanogaster* occur at sea in the same area from South Africa through the Indian Ocean to New Zealand. However, *leucogaster* does NOT occur in the south of South America.

So far *leucogaster* has not been found breeding.

The birds mentioned as having been collected by Sir George Grey, erroneously said to be from Australia, have now been proved, from the British Museum register, to have come from Cape Agulhas, off South Africa, and are *leucogaster*.

The following is a description of the type of *leucogaster*. General colour above blackish brown, darker on the head and sides of the face; feathers of the back with wide white fringes; rump white; tail black, all but the central pair with white bases; primaries, secondaries and their coverts black; middle wing coverts brown; throat and breast blackish brown; abdomen, sides of the body and vent white, like the inner underwing coverts; under tail coverts white at the base and brownish at the end and tipped with white; some of the longest coverts are half white and brownish; under aspect of primaries greyish with white towards the base, on the inner web; under primary coverts brown edged with white; coverts round the bend of the inner wing brownish with lighter

edges. Lat. $35^{\circ} 1'$ South ; Long. 15° East. Total length 218 mm. ; culmen 15 ; wing 157 ; tail 75 (fan-shaped) ; tarsus 41 ; toe with claw 25.

KEY TO THE SUBSPECIES.

Wing measurement smaller *F. l. leucogaster*.
 Wing measurement larger *F. l. deceptis*.

GENUS *FREGETTORNIS*.

Fregettornis Mathews, *Birds Austral.*, vol. ii, pt. 1, p. 31, May 30th, 1912. Type (by original designation) *Procellaria grallaria* Vieillot.

KEY TO THE SPECIES.

*a*¹. Uniform black *F. royana*.
*a*². Under surface from breast white.
 Some white feathers with dark centres *F. guttata*.
 No white feathers with dark centres *F. grallaria*.

1. **FREGETTORNIS GRALLARIA** (Gould). **White-fringed Storm Petrel.**

(Pl. IX, figs. 3, 3a, 4, 4a, 5, 5a, 7, 7a ; text-fig. 2.)

Figured as *Fregetta grallaria* in my *Birds of Australia*, vol. ii, pl. 72, 1912, and in my *Birds of Norfolk and Lord Howe Islands*, pls. 6 and 10, 1928.

In the *American Museum Novitates*, No. 124, July 22nd, 1924, Dr. Robert C. Murphy proved that the type of *grallaria* did not come from Australia and restricted the type locality to the breeding form on Juan Fernandez Island. Wing of typical birds 153.9 mm. ; *innominatus* 160.8 ; *titan* 181.6. In the same publication, No. 322, July 14th, 1928, p. 4, Murphy named his large form *titan* ; he had 17 males and 10 females. The females slightly exceed the males in size ; in 63 skins measured from Juan Fernandez, the females also were slightly larger.

Now, *grallaria* occurs commonly in the South Pacific Ocean, between Australia and South America, and in the Atlantic, and we have four forms :

a. Fregettornis grallaria grallaria (Pl. IX, figs. 4, 4a ; text-fig. 2), breeding on Juan Fernandez group.

Thalassidroma segethi Philippi and Landbeck 1860, Chile, is a synonym.

b. Fregettornis grallaria innominatus, breeding on Lord Howe Island.

c. Fregettornis grallaria titan (Pl. IX, figs. 5, 5a, 7, 7a), breeding on Rapa Island, in the Australian group.

d. Fregettornis grallaria tristanensis (Pl. IX, figs. 3, 3a) ; see farther on.

I feel convinced that the following all refer to *grallaria* typical.

Thalassidroma fregetta Lawrence, *Ann. Lyc. Nat. Hist. New York*, vol. v, No. 3, p. 117, May 1851. St. Marks, Florida.

Fregetta lawrencii Bonaparte, *Comptes Rendus Sci. Paris*, vol. xlii, p. 769, 1856, April 28th. Florida, south of the United States (for the bird described by Lawrence in 1851).

Cynadroma grallaria Ridgway, *Mem. Mus. Comp. Zool. Harvard (Water Birds, North Amer.)*, vol. ii), vol. xiii, p. 419, 1884. Florida (for the bird described by Lawrence in 1851).

I have to thank my friend Mr. Harry S. Swarth for sending me over the

series of *grallaria* in the California Academy of Sciences, as used by Loomis; all these agree with other skins examined in having white fringes to the feathers of the upper surface and white underwing linings.

The one collected south of the Galapagos Island, in 4° 20' South and 93° 30' West, is nearest to the subspecies *titan* (wing 178 mm.) (cf. *Emu*, vol. xxii, p. 91, line 16, 1922), and the drawing of the foot, text-fig. 5, 5a, is from this specimen. It is smaller and lighter in colour than *titan*, with the fringes to the feathers on the upper surface very wide and not worn off. Wing 178 mm.; culmen 16; tail 85; tarsus 40; outer toe and claw 27; middle 26, inner 25. It has the same white basis to the tail feathers as *titan*. The other skins were all from off Chile and therefore the typical form.

From the Stockholm Museum, Professor E. Lönnberg has sent me a skin collected in Patagonia on February 20th, 1850, which agrees with the typical form. Wing 162 mm.; culmen 13; tarsus 37; tail 78; toes with claw 22.

In the *American Museum Novitates*, No. 124, July 22nd, 1924, the bird called *Fregetta lineata* on p. 7 is the same as the bird called *grallaria* on p. 9, cf. Murphy in a letter to me dated January 25th, 1932, or it can be called *Fregetta guttata* sp. nov., as it differs from *grallaria* in having the white under surface streaked with blackish brown.

FREGETTORNIS GRALLARIA TRISTANENSIS Mathews. The Tristan Storm Petrel.

(Pl. IX, figs. 3, 3a.)

Fregettornis grallaria tristanensis Mathews, *Bull. Brit. Orn. Club*, vol. lii, p. 123, April 30th, 1932. Inaccessible Island, Tristan da Cunha group.

Adult.—Head blackish; throat and upper chest dark blackish brown; the feathers of the throat are uniform brown, those on the upper chest have white bases to the feathers; lower hind neck, back and adjoining wing coverts dark brown, each feather with a white edge; some of the primary coverts black with white edges to the feathers; primaries black, with white bases, the smaller primaries and secondaries the same, but with a greyish wash; the secondaries have white edges to the feathers; rump white, like the under surface from the chest to the vent; the vent feathers are white with brownish-black tips; the longer ones blackish with large white bases to the feathers; some few are also tipped with white; tail even and black, the central pair all black, the remainder with white bases on the inner web. The under aspect of the wing has the feathers surrounding the bend of the wing from the axillaries to the primaries blackish, those immediately above the primaries with white edges; remainder of the inner wing coverts white; under primary coverts greyish, all but the first edged with white; the primaries show matt brown from the underside, not black as from above. Eyes brown. Bill, legs and feet black. Total length 193 mm.; bill 14; wing 160; tail 71; tarsus 38; middle toe and claw 24. Taken on Inaccessible Island, Tristan Group, on April 28th, 1923 (South Atlantic Ocean), now in the Scottish Museum. Five specimens examined.

An example in the Tring Museum taken in Lat. 37° 14' S. and Long. 10° 5' W., near Tristan da Cunha, on January 27th, 1904, has the inner underwing coverts white, surrounded by the usual blackish lining; vent white, longer under tail coverts black with white bases and narrow white fringes. The feathers of the

back dark blackish brown with white fringes. Wing coverts with few white fringes. Bill, legs and feet black; eyes dark chestnut. It measures: bill 14 mm.; wing 165; tail 78; tarsus 40; middle toe and claw 24.

The Tring Museum bird compared with the Scottish Museum bird is practically the same, even the dark band on the rim of the underwing has the same white edges to the feathers; the long dark under tail coverts with the white base, and white fringes. In the Tristan bird (April 28th, 1923) the primary coverts have perhaps more white fringes than the Tring specimen from near Tristan. The Tring specimen is lighter on the inner dark underlining of the wing, and is a female.

A skin in the Bird Room, from the South Atlantic, also is similar: wing 170 mm.; tail 79; culmen 15; tarsus 38; middle toe and claw, 23, outer 23, inner 22.

Distr.—Tristan da Cunha group, breeding on Inaccessible Island.

We have two skins of *tristanensis* in the Scottish Museum from the Gordon collection, one from Tristan da Cunha collected in 1919, with a wing 160 mm., and another collected on Inaccessible Island on April 28th, 1923, with a wing of 160. In one skin the outer web of the outermost tail feather is all black; in another all but the second from the outside have the outer web black, this feather has the white on both webs. In one skin there are only a few feathers on the upper surface with white fringes. In a series these birds seem lighter than *grallaria*; their wings measure 156, 160, 160, 167, 170 mm., the average being about the same as in *innominatus*.

In properly made-up skins the feet do just project beyond the tail. A skin in the South African Museum from Tristan measures: wing 156 mm.; tarsus 36; tail 76; the smallest skin examined.

In *Beiträge zur Zoologie*, etc., 1820, Kuhl has a monograph of the Petrels from p. 135 to p. 149, where he treats of twenty-seven species.

On p. 138 he has *Proc. Fregatta*, of which he makes *P. aquerea* a synonym. *P. Fregatta* is, of course, preoccupied by *P. fregata* L., so the next name is *aquerea*.

The author gives the measurements as: total length 203 mm.; wing 160; tail 82; tarsus 39; middle toe 20. And he gives a figure of the head; the bill measured in the usual way gives 15.

He ends his description by saying "Dorsi plumis albedo marginatis"; this can only apply to *grallaria* or *leucogaster*, but which?

Type locality: off the east coast of South America. The mouth of the River de la Plata, Atlantic Ocean.

Should this name be used for my *Fregattornis grallaria tristanensis*, or is it indeterminate?

In the *Auk*, vol. xxxi, No. 4, October 1914, Dr. R. C. Murphy records that *F. grallaria* was seen in the South Atlantic from Lat. 7° 07' to South Georgia.

2. FREGETTORNIS GUTTATA sp. nov. Spotted-breasted Storm Petrel.

Fregatta lineata (not Peale) Murphy, *Amer. Mus. Novit.* No. 124, p. 7, July 22nd, 1924. Huapu Island, in the Marquesas Group.

Adult.—Upper surface blackish brown, including the head, which is darkest, back, scapulars and wings; some of the feathers on the back and scapulars with white fringes; the four outer tail feathers have the outer web uniform black

and the inner web white at the base ; the four central ones being uniform black ; rump white, some of the feathers with a black tip ; primaries lighter on the inner web with white bases ; primary coverts blackish, wing coverts lighter ; throat and upper breast like the upper surface ; lower breast to the vent white, many of the feathers with a dark streak along the shaft ; under tail coverts dark brownish with white fringes ; under aspect of primaries brown, under primary coverts brown ; inner coverts and axillaries white ; the coverts running round the inner upperwing blackish brown. Eyes brown ; bill, legs and feet, including the webs, black. Total length, in the flesh, 203 mm. ; expanse of out-stretched wings 438 ; wing 165 ; tail 73.5 ; exposed culmen 14 ; tarsus 38 ; middle toe and claw 22. The three toes are subequal in length, the outermost being a shade longer than the others. The nails are flat and broadly triangular. The tail of twelve feathers is doubly emarginate, the central and lateral quills being of the same length. The tarsus has the reticulations perceptible.

Collected by Beck off Huapu Island, in the Marquesas Group, on September 15th, 1922. It was feeding in a streak of oily water in company with large numbers of *Bulweria* and *Fregetta grallaria*. It seemed to be a breeding female.

The sexes are alike in this genus.

The immature, nest and eggs are also presumed to be similar to those of *grallaria*.

3. FREGETTORNIS MELANOLEUCA (Salvadori). The Black-and-White Storm Petrel.

(Pl. IV ; Pl. IX, fig. 11.)

Fregetta melanoleuca Salvadori, *Bull. Brit. Orn. Club*, vol. xxi, p. 79, April 27th, 1908 ; "Tristan da Cunha" (the locality is in doubt).

Adult (type).—The upper surface, including the head, back, scapulars and wings, blackish, with no white fringes to the feathers ; rump white, some of the upper tail coverts with dark tips ; tail even, feathers black with white bases to all but the central pair of feathers ; throat and upper breast lighter than the back ; the feathers nearer the white abdomen have larger white bases than those near the throat ; lower breast to the vent white ; under tail coverts white with blackish-brown edges ; the longest coverts have the feathers half white and brown ; feathers round the upper leg brown ; primaries, secondaries and their coverts black ; upperwing coverts brown ; under aspect of primaries lighter ; the inner basal edge of the inner web white ; under primary coverts brown with white edges ; inner underwing coverts white ; the coverts running round the bend of the wing blackish brown ; under tail coverts black with white bases to the feathers. Total length 210 mm. ; culmen 14 ; wing 165 ; tarsus 41 ; tail 78 ; middle toe and claw 28, outer toe and claw 27, inner toe and claw 27.

This is a difficult bird to place, and I cannot match it in the long series of birds in front of me. The claws are different in shape from those of *tristanensis*. There is no sign of any scutellations on the tarsus or toe joints. The equilateral shape of the foot places it near *F. grallaria tristanensis*.

It was bought at the Bullock sale in 1819 by Professor Bonelli and is now in the Turin Museum in Italy.

Distr.—Not determined accurately.

4. FREGETTORNIS ROYANA Mathews. The Black Storm Petrel.

Cf. Mathews, *Birds of Norfolk and Lord Howe Islands*, October 16th, 1928, pp. 7-12, plates 5-10.

Many of the tube-nosed birds are dimorphic, such as *Pterodroma neglecta*; *Macronectes*, etc. This we know from proved facts, which have helped us much in other cases. With a proven case all is of course easy, but a certain school considers, without, in my opinion, sufficient reason, that many more petrels have two phases. This is a nice lazy way of getting rid of trouble, but is it scientific? Science is knowledge set in order. Surely guessing cannot be the correct way of going to work. This upas¹ poison started years ago in California, and flourishes in other parts of the world.

When we get many skins of *Fregetta grallaria* from its breeding-grounds, that is, Santa Clara Island and Rapa Island (two different subspecies), we find them resembling each other like peas in a pod. Now we get another subspecies breeding on Lord Howe Island; these also resemble each other, and in general those of the other two forms. They all have white fringes to the feathers on the upper surface and white under wing coverts and a decided white rump.

Also breeding on Lord Howe Island is a bird of the same size as the subspecies of *grallaria*, but a uniform black; Mr. Roy Bell, who collected for me for a year on this island, sent me the wings of about twenty birds, the bodies of which had been eaten by cats, so it is presumed to be fairly common. This I named *royana*.

He also sent me two adults and one immature, with down still adhering to the head, of a form I named *alisteri*.

Another bird lent me from the same island I named *howensis*.

In the *Emu*, vol. xxii, pt. 2, October 1922, pp. 81-97, Messrs. Kinghorn and Cayley have a very useful and interesting paper on these birds, with a coloured plate, and photos of the back and front view of *leucogaster* and *melanogaster*, plates 28 and 29. On plate 27 they give a photo of the underside of three birds, which may show the dark *royana* blending into the white-bellied *alisteri*. All these have dark underwing coverts.

In *alisteri* the rump and upper tail coverts are never all white; the same remarks apply to *howensis*. Now, it may be possible, by that unscientific process called analogy, to say that *alisteri* and *howensis* are the same as *royana*.

Also breeding on Lord Howe Island is a bird about the same size as the above, which I called *insularis*; this bird has a decided white rump; the inner underwing coverts white, the entire under surface from the breast to the under tail coverts white, but the feathers of the upper surface without the white fringes, except two or three feathers in the middle of the back.

In my *Birds of Norfolk and Lord Howe Island*, October 16th, 1928, I give a plate of each of these forms, and one of their feet.

After *grallaria* loses its down, it always has white edges to the feathers of the back and wings, or, as in worn specimens, the frayed edges showing where the white tips have broken away. I have found *no exception* to this in the long series of about 180 skins examined.

I have now examined twelve skins of *Fregettornis* from Lord Howe Island, that is, the entire material available to date. There are three of the form *innominatus* which agree in all essentials with each other and disagree with the

¹ The upas tree was said to asphyxiate those who came under its influence.

other nine. All other forms of *grallaria* agree in all essentials with their fellows. So far this is easy.

When we examine the other nine skins we find them to vary in a way not found in the long series of 180 skins of *grallaria* and its subspecies. What does this indicate? These nine birds have the feathers of the back uniform, without the white fringes to the feathers, even in the one with down still adhering to the crown of the head. We have two skins of the uniform *royana*; another with the vent whitish; another with still more of the under surface whitish; three of the form *alisteri*; one of *howensis* and one of *insularis*. That is to say, that they agree with each other in having the upper surface alike, and disagree with any form of *grallaria*; on the under surface we have the uniform *royana*, connecting through *howensis* and *alisteri* with *insularis*; this last form is not so easy to place.

When this series is examined together, it is impossible to consider them as all one species. I prefer to consider *innominatus* as a subspecies of *grallaria*; and if we must unite the ones without the white fringes, the oldest name is *Freggetornis royana* 1914, with *insularis* 1915, *alisteri* 1915, and *howensis* 1928 as synonyms. The series of *alisteri*, *royana* and *howensis* have a tarsus with the constant measurement of 36 mm., the three *innominatus* 37-39 and *insularis* 38.

On going through the series with Dr. Percy Lowe, of the British Museum, he considered that there were two species: the form of *grallaria* which had retained through life the juvenile character of the white fringes to the feathers of the upper surface; and another form which, as shown by the skin with down still adhering, never has these fringes.

The measurements of the tail feathers seem to vary too much to be used as a character; the white bases to the tail feathers, however, seem more constant. In typical *grallaria* and *titan* the outer web of the outer tail feather is practically all black, the inner web white for half its length, the next two feathers have the base of both webs white, sometimes also the fourth as well. The fourth and fifth have the outer web light greyish and the inner web white; the central feather all black, sometimes the feather next to it also is uniform.

In *tristanensis* the outer web of ALL the feathers is black, the inner being white in all but the central pair. In one case the second feather from the outside has both webs white.

GENUS *PEALEA*.

Pealea Ridgway, *Auk*, July 1886, p. 334; type by original designation: *Thalassidroma lineata* Peale.

Similar to *Freggetta*, but first primary longer than the third instead of much shorter; basal joint of middle toe equal to or shorter than the rest of toe and claw instead of much longer.

PEALEA LINEATA (Peale). **The Lined Storm Petrel.**

(Pl. VI; Pl. IX, figs. 8, 8a.)

Thalassidroma lineata Peale, *U.S. Explor. Exped.*, vol. viii, *Birds*, p. 293, October 1848; Upolu, Samoa. Cassin, *ib.*, 2nd ed. p. 403, pl. 39, 1858.

Adult, Male (type).—General colour above uniform sooty black, including the head, nape and back; primaries, secondaries and their coverts black; tail black all but the two central tail feathers with the inner web white at the base,

for about half the length of the feather, the white running back obliquely from a point on the shaft; the shaft white as far as the white inner web, black from thereon; rump white, some of the feathers on the lower back bordering this white have dark bases and white tips with a broad, irregular black subterminal band; some of the white rump feathers with a dark shaft streak at the tip; throat mottled, the feather with white bases and dark tips; lower breast and chest sooty like the back; from the chest to the vent white, all the feathers with wide black cuneate streaks at the tip; under tail coverts projecting to 10 mm. from the end of the tail feathers, black with white bases; under aspect of primaries sooty with no white on the inner web or base; lower underwing coverts sooty with light fringes; next series with wide white fringes; the coverts round the bend of the wing sooty. Total length 187 mm.; culmen (exposed) 14; wing 166; tail 76; tarsus 34.5; middle toe and claw 31, outer toe and claw 30, inner toe and claw 25. This skin still remains unique.

I have to thank Mr. J. H. Riley, of the Smithsonian Institution, Washington, D.C., for much help; he pointed out the generic characters of *Pealea*, corrected my description of the type and gave the measurements. We now have a modern description. The type was collected on the island of Upolu in Samoa; the native who obtained the specimen stated that the birds "bred in holes, very high up in the mountains." If this is so, no doubt the species has been exterminated by the vermin.

Peale says "the toes remarkably broad and flattened; wings when closed projecting one inch beyond the tail; toes reaching three-quarters of an inch beyond the tail."

The drawings here published are made from the sketches sent me from Washington, taken from the type, of the upper and under view of the wing and expanded tail and of the foot. The colouring is taken from the painting by Peale published in 1858.

In the *Check List of Birds of the World*, 1931, p. 70, Mr. J. L. Peters says that "Dr. Murphy tells me that *lineata* is only a phase of some species of *Fregatta*." With this I do not agree.

In the *Auk* for 1886, July, p. 334, where Ridgway introduced the genus *Pealea*, he says that the claws are very broad, flat and blunt, that the tarsus exceeds in measurement that of the middle toe with claw by the length of the culmen (to nasal tube) and that the first primary is equal in length to, or longer than, the third. He compared this bird with *Oceanites*.

GENUS *PEALEORNIS* MATHEWS.

Pealeornis Mathews, *Bull. Brit. Orn. Club*, vol. lii, p. 132, 1932; type: *P. maoriana*.

The foot of this bird, compared with that of any of the other Storm Petrels, is of quite a different shape. It is long and thin. When spread out and measured from the outside of the outer claw to the outside of the inner claw, the result is 20 mm. The inner toe is shorter than the middle and outer, which are almost equal; middle toe and claw measures 28 mm.

The basal joints of the toes are narrow and round, not broad and flat. Perhaps the middle basal toe joint is a trifle flattish.

I consider that *Pealeornis* is a perfectly good genus on foot construction; as is *Fregatta* with a foot shaped like an isosceles triangle and *Fregattornis* with its

equilateral-shaped foot, which measures 23 mm. from outside to outside and the same for the length of the middle toe and claw.

If a foot, spread out as in life, of *lineata*, *maoriana*, *grallaria* and *tropica* is examined, the structural differences are manifest and more easily understood than by all the writing. Cf. Pl. IX.

Dr. J. Berlioz has sent me a drawing of the foot of the two supposed *lineata* in the Paris Museum, collected by Quoy and Gaimard in *L' Astrolabe* in 1829, from New Zealand. I examined and measured these in 1930. This drawing agrees with the foot of the bird in the British Museum and disagrees with the foot of *grallaria*.

Mr. L. Delapchier also sent me drawings of the leg and foot of the type of *grallaria* and two views of the leg and foot of the *Pealeornis* in the Paris Museum.

The upper surface of these two specimens in Paris is very like that of *grallaria*, but is darker, nearly black; the wing coverts are paler brownish. One bird has some very faint whitish fringes to several feathers of the back; the other has the back entirely black. Compare drawing of the foot of *lineata* (= *Pealeornis*) and *grallaria*. *Ibis.*, July 1933, p. 546, Pl. XVIII.

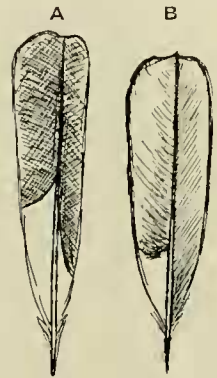
My friend Dr. J. Berlioz, who has been most helpful in comparing *grallaria* with his two specimens of *Pealeornis*, says: "Certainly the legs and feet of *Pealea* (= *Pealeornis*) and *Fregattornis grallaria* are very different, the former thinner with the toes longer and much slenderer; while *Fregattornis* is a heavier-built bird with toes short and broad.

"In *Pealea* (= *Pealeornis*) the rectrices are not as broad as those of *grallaria*. All except the middle ones have very sharply defined white bases, the white, as you say, more extended on the inner web.

"One of the specimens has the base of the outer web of the outermost rectrice distinctly white, this being much reduced, nearly obsolete, on the other specimen. However, there is always a very short white base on the outer web of all the external rectrices and a larger one on the inner web."

The shape of the foot of *Pealeornis* belongs to the thin-toed genera like *Oceanites* and *Garrodia*, but much nearer the former.

Pelagodroma is quite distinct, the foot is more like that of *Fregatta tropica*, but the basal toe joints are sealed and the basal joints of all the toes more rounded and it is of course longer. In all these the inner toe is distinctly the shortest. In *Fregattornis* all the toes are of about equal length.



A—*Pealeornis maoriana*.
B—*Fregattornis grallaria*.

PEALEORNIS MAORIANA Mathews. Maori Storm Petrel.

(Pl. V; Pl. IX, figs. 9, 9a, 10, 10a; text-fig. 1.)

Pealeornis maoriana Mathews, *Bull. Brit. Orn. Club*, lii, p. 132, 1932; Bank's Peninsula, New Zealand.

Distr.—New Zealand only (breeding on Bank's Peninsula?).

The following specimen was erroneously considered to be *Pealea lineata*. General colour above black, including the head, back and tail; upper tail coverts white, some of the feathers of the back immediately above the white rump have

white bases, followed by a broad black band and fringed with white; tail feathers black, all but the central pair with white bases; this white is more extended on the inner web; the tail feathers even in length and narrow in structure; primaries black, lighter on the inner web towards the edge; secondaries blackish brown; primary coverts black; remainder of wing coverts brownish; under surface with the feathers of the throat with white bases and brown tips giving a mottled appearance; chest blackish brown; abdomen, vent and sides of the body white; running down the sides of the body many of the feathers have a dark line along the shaft; some of the feathers round the thighs brown; under tail coverts with white bases and a broad black terminal band; under aspect of primaries matt; underwing lining with a broad blackish band running round the edge of the wing; inner underwing linings and axillaries white; bill, feet and legs black; eyes dark brown. Total length 180 mm.; exposed culmen 13; wing 150; tail 68; tarsus 36; middle toe and claw 28, outer toe and claw 27, inner toe and claw 24. Taken off Bank's Peninsula, New Zealand. Type in the British Museum. Three specimens.

In the foot of this bird it looks as though the webbing was cut out and then the toe joints glued on; while in the feet of the other species it gives the impression that the webbing was split open and the toe joints placed inside and then the upper covering pressed on to the joints, so different is the structure.

The tarsus is imperceptibly scutellated, as is the basal central toe joint. This toe joint is perhaps flattened on the upper surface.

Bonaparte, in his *Conspectus*, vol. ii, p. 200, October 1st, 1857, had a skin collected by the Astrolabe Expedition in 1829 (No. 254) in New Zealand on "*Promontorio orientali*," which is Bank's Peninsula. He placed this bird in the genus *Oceanites*, the feet more nearly resembling the feet of *oceanicus* than those of any other Storm Petrel. If the genus *Pealeornis* is not admitted, then *maoriana* must be included in *Oceanites*, as it does not fit into *Fregetta*, *Fregettornis*, or *Pealea*.

Dr. A. Wetmore has kindly had drawn for me the foot of the type of *lineata*. If we examine this drawing we see at a glance that it has nothing to do with *grallaria* of Vieillot.

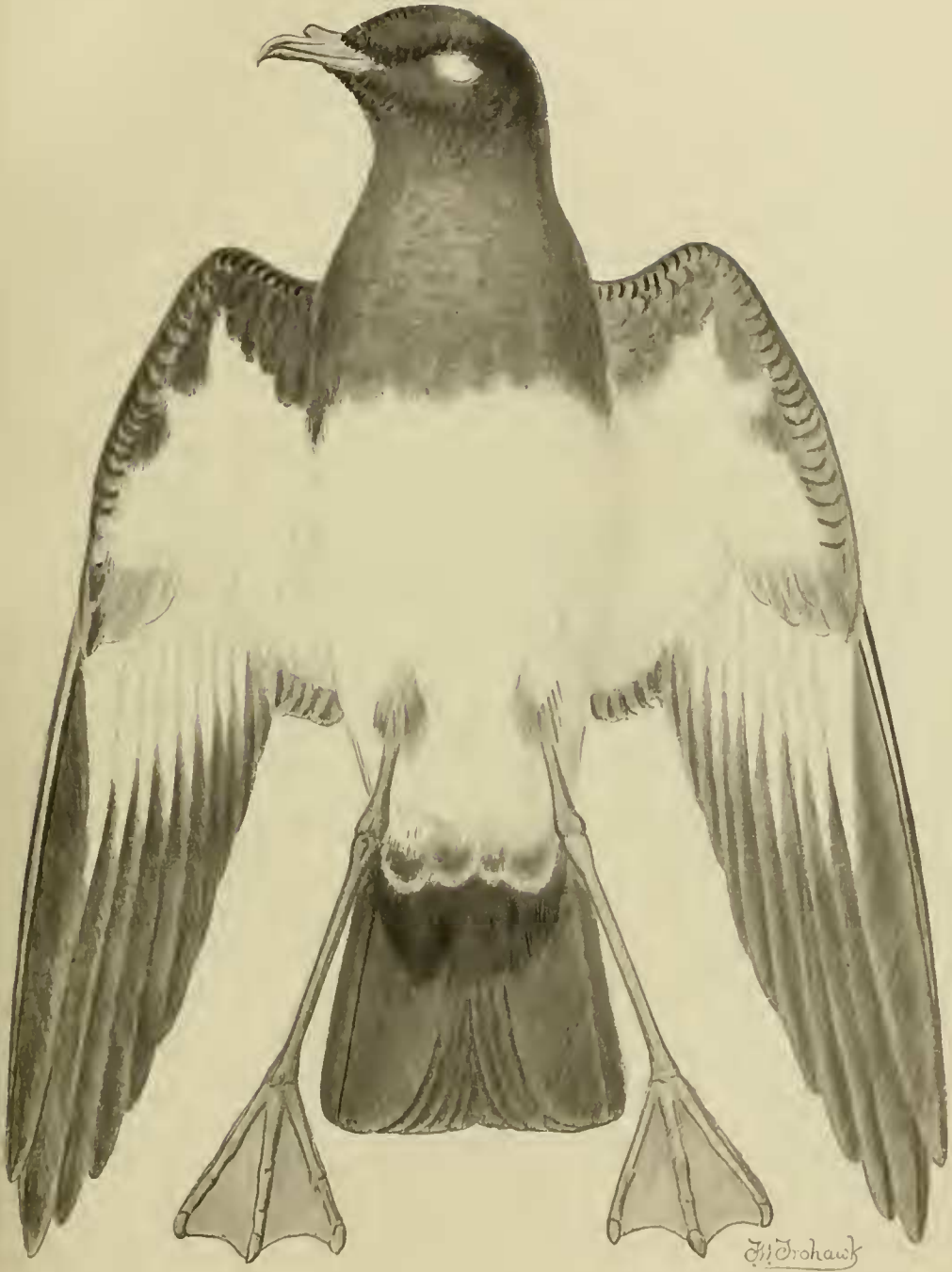
If we compare this drawing again with the drawing of the foot of the bird in the Natural History Museum, *Pealeornis*, and of the feet of the two specimens in Paris, we see that it also differs considerably. I therefore named the New Zealand bird as new.

The foot of the type *lineata* was drawn by Mrs. A. M. Ayl, and the foot of the bird in the British Museum by Mr. F. W. Frohawk.

Now, instead of having *Pealea* a varying species, the specimen remains unique; the supposed *Pealea* from the Marquesas turns out to be *Fregettornis grallaria*.

The following is Dr. Wetmore's letter:

"In reply to your letter of March 15th, 1932, Dr. Friedmann, Mr. Riley and I have all examined the type specimen of *Pealea lineata*. To answer your questions the basal toe joints in our specimen of *Pealea* are smooth, without indication of scales. I have verified this under a lens. The middle toe has the basal joint flattened, while the one on either side has the basal joint rounded. The tarsus is booted.



John Bull, Stone & Engravers, Ltd., London

FREGETTORNIS MELANOLEUCA, type.

